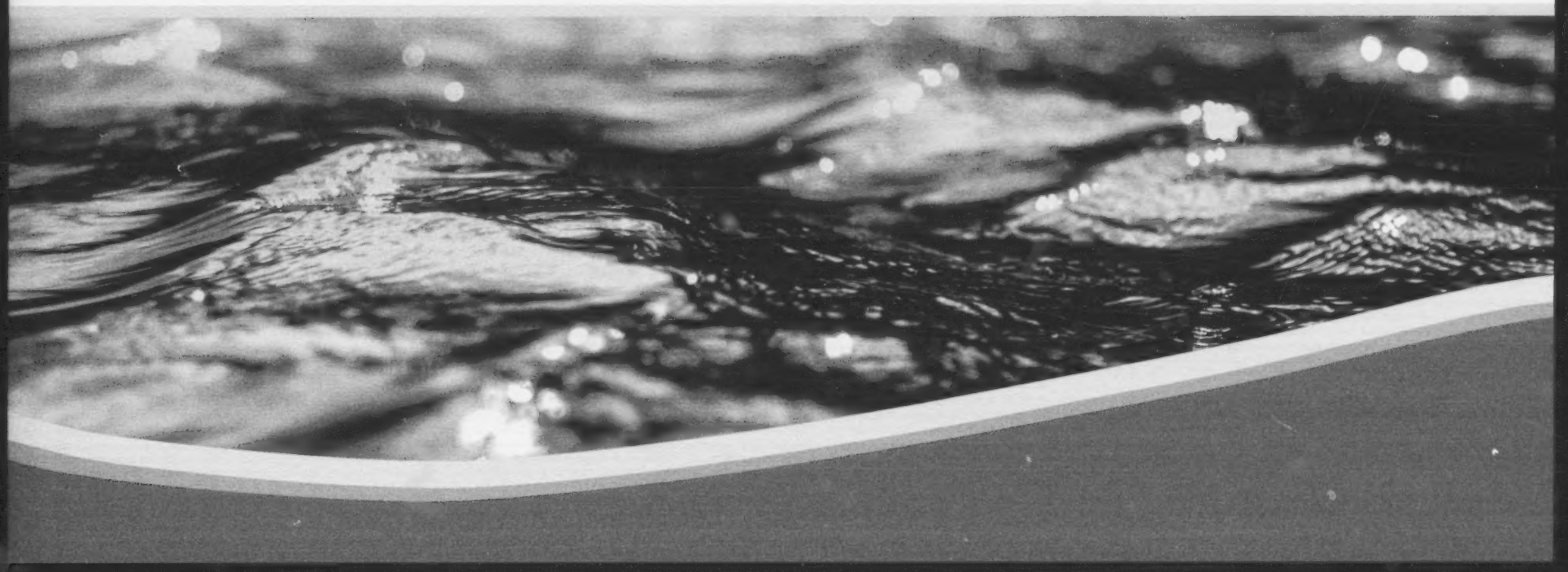
Quarterly Oil and Gas Water Management Summary

BC Oil & Gas COMMISSION

Fourth Quarter 2016 (October - December)



PURPOSE

This *Quarterly Oil and Gas Water Use Summary* presents short-term water use and water licence data from the Q4 October to December 2016 period.

Previous annual water use reports and quarterly water use summaries are available on the BC Oil and Gas Commission website at www.bcogc.ca.

TABLE OF CONTENTS

ROLE OF THE BC OIL AND GAS COMMISSION..... 4

HOW WATER IS USED 5

HOW WATER IS ACCESSED 5

LONG-TERM WATER LICENCES AND USE..... 6

TABLE 1 - SUMMARY OF WATER LICENCES AND USE FOR OIL AND GAS ACTIVITIES FROM JANUARY TO DECEMBER 2016 6

TABLE 2 - OIL AND GAS RELATED WATER LICENCES THAT WITHDREW WATER FROM OCTOBER TO DECEMBER 2016 6

SHORT-TERM WATER APPROVAL AND USE..... 7

TABLE 3 - SUMMARY OF SHORT-TERM APPROVAL AND USE FOR OIL AND GAS ACTIVITIES FROM JANUARY TO DECEMBER 2016 7

INTRODUCTION OF WATER SUSTAINABILITY ACT..... 8

TABLE 4: SUMMARY OF WATER ALLOCATION AND USE FOR OIL AND GAS ACTIVITIES IN 2016, ORGANIZED BY OGC WATER MANAGEMENT BASIN..... 10

Role of the

BC OIL AND GAS COMMISSION

The BC Oil and Gas Commission (Commission) is the provincial regulatory agency with responsibilities for regulating oil and gas activities in British Columbia, including exploration, development, pipeline transportation and reclamation.

The Commission's core services include reviewing and assessing applications for industry activity, consulting with First Nations, cooperating with partner agencies, and ensuring industry complies with provincial legislation and all regulatory requirements. The public interest is protected by ensuring public safety, respecting those affected by oil and gas activities, conserving the environment, and ensuring equitable participation in production.

The Commission is responsible for reviewing, assessing, and making decisions on water authorizations from both surface and subsurface water sources. The Commission has the expertise and tools to make informed water allocation decisions, and protecting and maintaining environmental and community water needs are its first priorities.

Commission Office Locations Throughout B.C.

HOW WATER IS USED

Water is used for various purposes in the oil and gas industry.

The largest use of water for oil and gas activities is for hydraulic fracturing.

However, water is used for other purposes, such as:

- Seismic or geophysical exploration
- Drilling
- Machine washing
- Dust control
- Water floods (to enhance oil recovery)
- Ice road freezing
- Hydrostatic testing of pipelines

HOW WATER IS ACCESSED

There are different ways the oil and gas industry may access water in British Columbia. Some methods are managed through provincial legislation, including:

- **Water licences** issued under the Water Sustainability Act (WSA) for surface and groundwater. The Commission has staff designated as Regional Water Managers with authority for issuing and administering long-term water licences.
- **Short-term surface water use or diversion approvals** issued under Section 10 of the WSA. Short-term water use is administered by the Commission.
- **Water source wells** authorized by the Commission under the Oil and Gas Activities Act (OGAA). Water source wells are a specific type of well where the water withdrawn is intended for injection into an underground formation to enhance oil or natural gas recovery.
- **Flowback water** that returns to the surface after being injected for hydraulic fracturing.
- **Produced water** that flows to the surface as a by-product of oil and gas production.

The oil and gas industry can access water by means outside of regulatory oversight:

- **Private agreements** can be made with landowners or others who have a source of surface water supply such as a dugout or a groundwater well. In some cases, private agreements may require a Waterworks water licence under the WSA.

LONG-TERM WATER LICENCES AND USE

At the end of the fourth quarter of 2016, there were 21 active oil and gas related water licences, representing 37 withdrawal locations, held by 10 companies (Table 1).

The total annual licenced water volume was 17,825,759 m^3.

A total of 862,790 m^3 of licenced water was reported as withdrawn for the year (Table 1).

During the fourth quarter 2016, three companies withdrew water by way of water licences, totalling 167,789 m^3 (Table 2).

A break-down of water licence allocation and use by OGC Water Management Basin is listed in Table 4.

TABLE 1 - SUMMARY OF WATER LICENCE AND USE FOR OIL AND GAS ACTIVITIES FROM JANUARY TO DECEMBER 2016

		Q1	Q2	Q3	Q4
WATER LICENCE	Companies with Active Water Licences	7	10	10	10
	Active Water Licences	16	21	21	21
	Licenced Withdrawal Locations	31	37	37	37
	Annual Volume Available for Use for Water Licences (m^3)	15,548,135	17,825,759	17,825,759	17,825,759
	Cumulative Volume Reported Used in 2016 (m^3)	287,680	403,609	695,001	862,790

TABLE 2:
OIL AND GAS RELATED WATER LICENCES THAT WITHDREW WATER FROM OCTOBER TO DECEMBER 2016

LICENCE #	LICENCEE	SOURCE	OGC WATER MANAGEMENT BASIN	ANNUAL APPROVAL (m^3/YR)	Q4 WATER USE (m^3/YR)
C112155	Whitecap Resources	Peace River	Lower Peace River	1,825,000	137,835
C132688	Canadian Natural Resources Limited	Charlie Lake	Lower Beatton River	394,000	15,128
C133155	Canbriam Energy Inc.	Williston Lake	Peace Arm	3,650,000	14,826

SHORT-TERM WATER APPROVAL AND USE

At the end of the fourth quarter of 2016, there were a total of 278 short-term water use approvals in place, representing 746 withdrawal locations, held by 44 companies (Table 3).

The total water volume associated with short-term approvals that were active on the last day of the quarter was 8,905,774 m^3.

A total of 798,752 m^3 was reported as withdrawn by oil and gas operators during the 2016 year (Table 3).

A break-down of short-term water approval and use by OGC Water Management Basin is listed in Table 4.

TABLE 3 - SUMMARY OF SHORT-TERM APPROVAL AND USE FOR OIL AND GAS ACTIVITIES FROM JANUARY TO DECEMBER 2016

		Q1	Q2	Q3	Q4
SHORT-TERM	Companies with Active Approvals	39	46	41	44
	Active Approvals	162	202	227	278
	Approved Withdrawal locations	753	749	653	746
	Volume Available for Use (m^3)	9,347,183	10,903,248	8,761,992	8,905,774
	Cumulative Volume Reported Withdrawn (m^3)	269,564	484,338	701,548	798,752

Introduction of the

WATER SUSTAINABILITY ACT

The Water Sustainability Act (WSA) came into effect on Feb. 29, 2016, resulting in changes to surface water and groundwater allocation processes by the Commission. With the implementation of the WSA, the following regulations were created or revised and brought into force:

- Water Sustainability Regulation (replaces Water Regulation)
- Groundwater Protection Regulation (revised)
- Dam Safety Regulation (revised)
- Fees, Rentals and Charge Tariff Regulation (new)

The WSA modernizes the language of the Water Act and introduces a number of significant policy changes. Examples of key items that affect oil and gas activities include, but are not limited to:

- Water in a stream, and the percolation and flow of groundwater, are vested to the Crown.
- The regulatory scheme for the diversion and use of stream water is maintained and applied to both stream water and aquifer water.
- The rights of prior appropriation are retained – First In Time, First In Right (FITFIR).
- The consideration of the environmental flow needs of a stream in licensing decisions is mandated for all water allocation decisions related to streams, and to aquifers "reasonably likely" of being hydraulically connected to a stream.
- Explicit notification, objection and appeal rights for short-term water use approvals and changes in and about a stream are specified (appeals are to the Environmental Appeal Board).
- Deep groundwater is exempted from the requirement for a water licence.
- New powers are created to be applied when streams are at risk of falling or have fallen below their critical environmental flow thresholds, to modify the existing precedence of water use for the purpose of protecting the aquatic ecosystem of streams and aquifers and essential domestic uses (i.e., FITFIR can be overridden).
- Authority is provided to statutory decision makers to require environmental mitigation or offsetting when the diversion and use of water, or changes in and about a stream, are likely to have a significant adverse impact on the water quality, water quantity or aquatic ecosystem of a stream or aquifer.

As there are significant changes resulting from the implementation of the WSA, operators are strongly encouraged to review the document Water Sustainability Act Applications Support for Operators. This supplemental outlines material changes to application manuals,

processes and fees, short-term water use approvals, water licensing, and the aforementioned regulations.

The WSA and its regulations may be viewed online:

Water Sustainability Act

Water Sustainability Regulation

Water Sustainability Fees, Rentals and Charges Tariff Regulation

Groundwater Protection Regulation

Dam Safety Regulation

WATER LICENCE APPLICATIONS

Water Licence Application

New Water Licence Application - Surface Water

New Water Licence Application - Groundwater

Existing Use Groundwater licence application

Provide Additional Information

Provide Additional Information for your Application

Administration of Surface Water Rights

Licence Transfer of Ownership or Name Change

Abandonment / Amendments (Changes) to an existing Water Licence

Abandonment

Apportionment

Change of Purpose

Change of Works

Abandon Application

Abandon Your Application

Applications, abandonments, and amendments for water licences are now submitted through an online form at the following web address:

www.bcogc.ca/public-zone/water-information/water-licences

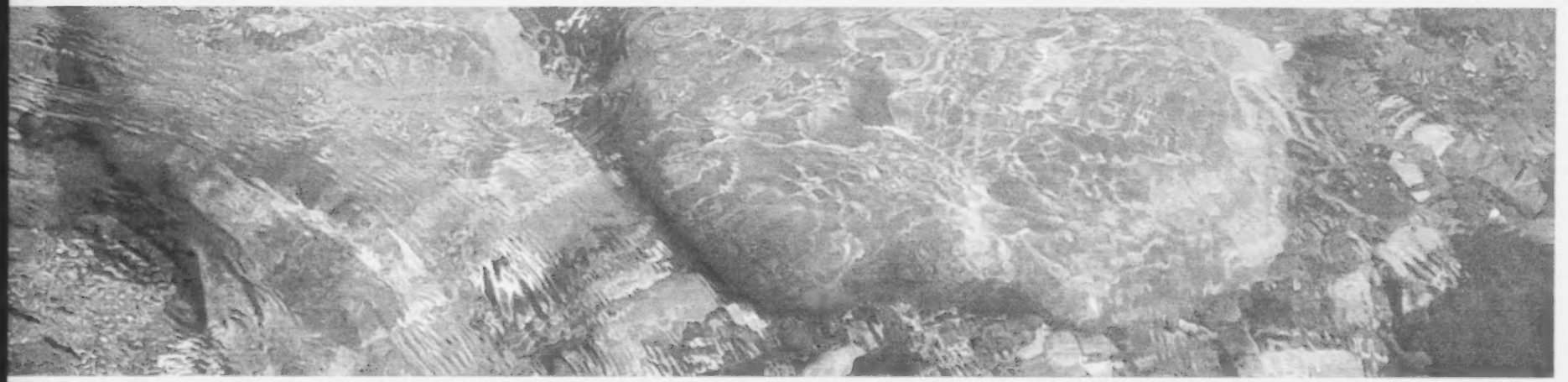


TABLE 4 - SUMMARY OF WATER ALLOCATION AND USE FOR OIL AND GAS ACTIVITIES IN 2016, ORGANIZED BY OGC WATER MANAGEMENT BASIN (Page 1 of 4)

MAJOR and Sub-Basin Name	SHORT-TERM WATER USE APPROVALS - BC OIL AND GAS COMMISSION					OIL AND GAS RELATED WATER LICENCES					
	NUMBER OF APPROVED WITHDRAWAL LOCATIONS	TOTAL VOLUME APPROVED (m^3) FOR LOCATIONS ACTIVE ON 12/31/2016	TOTAL VOLUME APPROVED as % of MEAN ANNUAL RUNOFF	TOTAL VOLUME WITHDRAWN IN 2016 (m^3)	TOTAL VOLUME WITHDRAWN AS % OF MEAN ANNUAL RUNOFF	NUMBER OF LICENCED WITHDRAWAL LOCATIONS	TOTAL VOLUME LICENCED (m^3)	TOTAL VOLUME LICENCED as % of MEAN ANNUAL RUNOFF	TOTAL VOLUME WITHDRAWN IN 2016 (m^3)	TOTAL VOLUME WITHDRAWN as % of MEAN ANNUAL RUNOFF	MEAN ANNUAL RUNOFF (m^3)
BEATTON RIVER (sub-basin of Peace River)											
Upper Beatton River	21	1,251,970	0.251%	139,828	0.028%	2	780,000	0.156%			499,408,440
Middle Beatton River	26	195,437	0.078%	954	0.000%	0					249,152,995
Middle Beatton Total (incl. Upper Beatton)	**47**	**1,447,407**	**0.193%**	**140,782**	**0.019%**	**2**	**780,000**	**0.104%**			**748,561,435**
Milligan Creek	14	323,895	0.169%	0	0.000%	0					191,536,686
Blueberry River	43	791,547	0.270%	776	0.000%	0		0.000%			293,278,540
Doig River	4	6,000	0.002%	0	0.000%	0		0.000%			323,069,523
Lower Beatton River	1	3,000	0.002%	0	0.000%	1	394,000	0.285%	43,845	0.032%	138,262,629
BEATTON TOTAL	**109**	**2,571,849**	**0.152%**	**141,558**	**0.008%**	**3**	**1,174,000**	**0.069%**	**43,845**	**0.003%**	**1,694,708,813**
HALFWAY RIVER (sub-basin of Peace River)											
Chowade River	0	0		0		0					327,027,527
Upper Halfway River	4	32,550	0.004%	590		0					795,962,409
Upper Halfway Total (includes Chowade)	**4**	**32,550**	**0.003%**	**590**	**0.000%**	**0**	**0**	**0.000%**			**1,122,989,936**
Graham River	3	306,300	0.036%	30,287	0.004%	0					860,627,172
Cameron River	24	959,289	0.429%	34,771	0.016%	0					223,679,567
Lower Halfway River	12	622,795	0.411%	6,960	0.005%	0					151,526,991
HALFWAY TOTAL	**43**	**1,920,934**	**0.081%**	**72,608**	**0.003%**	**0**	**0**	**0.000%**			**2,358,823,666**
MOBERLY RIVER (sub-basin of Peace River)											
Moberly River	1	23,102	0.006%	0		0					391,714,995
MOBERLY TOTAL	**1**	**23,102**	**0.000%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**391,714,995**
PINE RIVER (sub-basin of Peace River)											
Burnt River	0	0	0.000%	0	0.000%	0					737,930,022
Sukunka River	3	30,000	0.003%	0		0					1,047,282,572
Sukunka River Total (includes Burnt)	**3**	**30,000**	**0.002%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**1,785,212,594**
Upper Pine River	2	4,358	0.000%	1,840	0.000%	0					1,466,884,035
Murray River	4	30,096	0.001%	465	0.000%	8	390,000	0.014%	0	0.000%	2,698,285,017
Lower Pine River	27	244,626	0.178%	88,955	0.065%	1	650,000	0.472%	45,000	0.033%	137,619,889
PINE TOTAL	**36**	**309,080**	**0.019%**	**91,260**	**0.001%**	**9**	**1,040,000**	**0.017%**	**45,000**	**0.001%**	**6,088,001,535**

SUMMARY OF WATER ALLOCATION AND USE FOR OIL AND GAS ACTIVITIES IN 2016, ORGANIZED BY OGC WATER MANAGEMENT BASIN (Page 2 of 4)

MAJOR and Sub-Basin Name	SHORT-TERM WATER USE APPROVALS - BC OIL AND GAS COMMISSION					OIL AND GAS RELATED WATER LICENCES					
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KISKATINAW RIVER (sub-basin of Peace River)											
West Kiskatinaw River	0	0	0.000%	0	0.000%	0					117,515,115
East Kiskatinaw River	2	7,300	0.007%	1,170	0.001%	0					105,452,962
Middle Kiskatinaw River	11	64,531	0.115%	53,107	0.094%	0					56,347,972
Middle Kiskatinaw Total (incl. West & East)	**13**	**71,831**	**0.026%**	**54,277**	**0.019%**	**0**					**279,316,049**
Lower Kiskatinaw River	28	538,452	0.601%	7,167	0.008%	1	20,969	0.023%	0	0.000%	89,659,847
KISKATINAW TOTAL	**41**	**610,283**	**0.165%**	**61,444**	**0.017%**	**1**	**20,969**	**0.006%**	**0**	**0.000%**	**368,975,896**
PEACE RIVER											
Peace Arm	0	0		0		2	7,300,000		268,067		N/A
Upper Peace River	0	0	0.000%	0		0	0	0.000%			36,423,413,429
Lynx Creek	0	0	0.000%	0		0					30,436,635
Farrell Creek	4	40,706	0.045%	10,030	0.011%	0					91,018,843
Cache Creek	0	0	0.000%	0	0.000%	1	185,022	0.248%			74,603,546
Pouce Coupe River	10	218,716	0.086%	81,421	0.032%	2	132,754	0.052%			255,686,202
Lower Peace River	10	38,314	0.033%	8,577	0.007%	3	2,298,348	2.008%	493,887	0.431%	114,470,012
PEACE TOTAL (incl. Kisk/Pine/Moberly/Half/Beatton)	**254**	**5,732,984**	**0.012%**	**466,898**	**0.001%**	**21**	**12,151,093**	**0.025%**	**850,799**	**0.002%**	**47,891,853,572**
SMOKY RIVER											
Smoky River	10	56,700	0.002%	0	0.000%	1	2,500	0.000%			2,669,506,123
SMOKY TOTAL	**10**	**56,700**	**0.002%**	**0**	**0.000%**	**1**	**2,500**	**0.000%**			**2,669,506,123**
MUSKWA RIVER (sub-basin of Fort Nelson River)											
Upper Muskwa River	0	0	0.000%	0		0					1,725,201,511
Middle Muskwa River	0	0	0.000%	0		0					1,973,711,816
Middle Muskwa Total (incl. Upper Muskwa)	**0**	**0**	**0.000%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**3,698,913,327**
Lower Muskwa River	0	0	0.000%	0		0					646,841,560
MUSKWA TOTAL	**0**	**0**	**0.000%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**4,345,754,887**
PROPHET RIVER (sub-basin of Fort Nelson River)											
Upper Prophet River	1	2,250	0.000%	0	0.000%	0					1,470,271,289
Middle Prophet River	5	30,700	0.005%	0		0					621,428,680
Middle Prophet Total (incl. Upper Prophet)	**6**	**32,950**	**0.002%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**2,091,699,969**
Lower Prophet River	12	463,510	0.170%	6,974	0.003%	0					272,262,427
PROPHET TOTAL	**18**	**496,460**	**0.021%**	**6,974**	**0.000%**	**0**	**0**	**0.000%**			**2,363,962,396**

SUMMARY OF WATER ALLOCATION AND USE FOR OIL AND GAS ACTIVITIES IN 2016, ORGANIZED BY OGC WATER MANAGEMENT BASIN (Page 3 of 4)

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SIKANNI CHIEF RIVER (sub-basin of Fort Nelson River)											
Upper Sikanni Chief River	1	75,000	0.009%	0	0.000%	1	2,993,000	0.371%	11,991	0.001%	807,771,692
Middle Sikanni Chief River	34	256,180	0.027%	86,597	0.009%						949,755,794
Middle Sikanni Chief Total (incl. Upper Sikanni)	**35**	**331,180**	**0.019%**	**86,597**	**0.005%**	**1**	**2,993,000**	**0.170%**	**11,991**	**0.001%**	**1,757,527,486**
Lower Sikanni Chief	4	9,200	0.001%	0							875,678,142
SIKANNI CHIEF TOTAL	**39**	**340,380**	**0.013%**	**86,597**	**0.003%**	**1**	**2,993,000**	**0.114%**	**11,991**	**0.000%**	**2,633,205,628**
FORT NELSON RIVER											
Kahntah River	14	87,400	0.022%	1,210	0.000%	0					400,582,903
Fontas River	0	0	0.000%	0		0					591,531,903
Fontas Total (includes Kahntah)	**14**	**87,400**	**0.009%**	**1,210**	**0.000%**	**0**	**0**	**0.000%**	**0**	**0.000%**	**992,114,806**
Klua Creek	0	0	0.000%	0	0.000%	0					402,135,448
Upper Fort Nelson River	4	28,200	0.010%	410		0					276,181,026
Upper Fort Nelson Total (incl. Sikanni Chief Total, Kahntah, Fontas, Klua)	**57**	**455,980**	**0.011%**	**88,217**	**0.002%**	**1**	**2,993,000**	**0.070%**	**11,991**	**0.000%**	**4,303,636,908**
Snake River	7	25,000	0.008%	3,200	0.001%	0					310,763,522
Sahtaneh River	17	177,246	0.037%	17,084	0.004%	2	60,000	0.013%	0	0.000%	474,904,729
Middle Fort Nelson River	8	47,825	0.009%	5,470	0.001%	0			0		515,348,901
Middle Ft Nelson Total (incl. Upper Ft. Nelson total, Muskwa Total, Prophet Total, Snake, Sahtaneh)	**107**	**1,202,511**	**0.010%**	**120,945**	**0.001%**	**3**	**3,053,000**	**0.025%**	**11,991**	**0.000%**	**12,314,371,343**
Kiwigana River	21	54,000	0.012%	1,307	0.000%	5	42,500	0.010%			441,657,543
Lower Fort Nelson River	5	22,000	0.007%	100		0					312,768,938
FORT NELSON TOTAL	**133**	**1,278,511**	**0.010%**	**122,352**	**0.001%**	**8**	**3,095,500**	**0.024%**	**11,991**	**0.000%**	**13,068,797,824**
LIARD RIVER		0									
Muncho River	0	0		0		0					551,551,360
Upper Liard River	0	**0**		0		0					33,125,817,465
Upper Liard Total (incl. Muncho)	**0**	0	**0.000%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**33,677,368,825**
Grayling River	0	0		0		0					630,833,914
Upper Toad River	0	0		0		0					1,521,055,576
Racing River	0	0		0		0					1,488,336,681
Lower Toad River	0	0		0		0					419,472,722
Beaver River	0	0		0		0					10,862,659,426
Middle Liard River	0			0		0					463,652,312

LIARD RIVER con't on next page

SUMMARY OF WATER ALLOCATION AND USE FOR OIL AND GAS ACTIVITIES IN 2016, ORGANIZED BY OGC WATER MANAGEMENT BASIN (Page 4 of 4)

MAJOR and Sub-Basin Name	SHORT-TERM WATER USE APPROVALS - BC OIL AND GAS COMMISSION					OIL AND GAS RELATED WATER LICENCES					
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LIARD RIVER con't											
Middle Liard Total (incl. Upper Liard Total, Grayling, Upper Toad, Racing, Lower Toad, Beaver)	**0**	**0**	**0.000%**	**0**	**0.000%**	**0**	**0**	**0.000%**			**49,063,379,456**
Capot-Blanc Creek	4	40,000	0.022%	35,032	0.019%	0					183,879,851
Dunedin River	0	0	0.000%	0	0.000%	0					820,464,167
Lower Liard River	11	342,610	0.028%	94,239	0.008%	0					1,236,634,664
LIARD TOTAL (incl. Fort Nelson)	**148**	**1,661,121**	**0.003%**	**251,623**	**0.000%**	**8**	**3,095,500**	**0.005%**	**11,991**	**0.000%**	**64,373,155,962**
PETITOT RIVER											
Sahdoanah River	46	43,380	0.017%	6,953	0.003%	0					252,625,362
Upper Petitot River	62	88,085	0.006%	1,459	0.000%	0					1,476,579,488
Tsea River	51	59,405	0.014%	4,188	0.001%	3	2,520,000	0.581%	0	0.000%	434,062,484
Middle Petitot River	19	28,825	0.004%	3,983	0.001%	2	26,666	0.004%			698,562,753
Middle Petitot Total (incl. Sahdoanah, Upper Petitot, Tsea)	**178**	**219,695**	**0.008%**	**16,583**	**0.001%**	**5**	**2,546,666**	**0.089%**	**0**	**0.000%**	**2,861,830,087**
Lower Petitot River	29	55,800	0.006%	1,260		2	30,000	0.003%			904,314,069
PETITOT TOTAL	**207**	**275,495**	**0.007%**	**17,843**	**0.000%**	**7**	**2,576,666**	**0.068%**	**0**	**0.000%**	**3,766,144,156**
HAY RIVER											
Upper Kotcho River	1	4,000	0.001%	0	0.000%	0					311,519,217
Kyklo River	2	13,000	0.009%	8,640	0.006%	0					145,897,691
Shekilie River	28	181,600	0.040%	66	0.000%	0					450,747,494
Lower Kotcho River	2	7,500	0.002%	2,666	0.001%	0					311,519,217
Lower Kotcho Total (includes Upper Kotcho, Kyklo, Shekilie)	**33**	**206,100**	**0.017%**	**11,372**	**0.001%**	**0**	**0**	**0.000%**			**1,219,683,619**
Hay River	30	224,200	0.042%	29,990	0.006%	0					538,672,352
HAY TOTAL	**63**	**430,300**	**0.024%**	**41,362**	**0.002%**	**0**	**0**	**0.000%**			**1,758,355,971**
CHINCHAGA RIVER											
Chinchaga River	30	109,097	0.100%	2,048	0.002%	0					109,492,680
CHINCHAGA TOTAL	**30**	**109,097**	**0.100%**	**2,048**	**0.002%**	**0**	**0**	**0.000%**			**109,492,680**
OTHER (outside Northeast B.C.)	**34**	**640,077**		**18,978**		**0**	**0**				N/A
GRAND TOTAL	**746**	**8,905,774**	**0.007%**	**798,752**	**0.001%**	**37**	**17,825,759**	**0.015%**	**862,790**	**0.001%**	**120,568,508,464**

Previous annual water reports and quarterly updates
are available on the Commission's website at:
http://www.bcogc.ca/public-zone/water-information

For specific questions or enquiries
regarding this data, please contact:
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